

DOCKET NO: 240441US0

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF :
HAJIME IKUNO, ET AL. : EXAMINER: MORILLO, J.
SERIAL NO: 10/620,388 : GROUP ART UNIT: 1742
FILED: JULY 17, 2003 : RCE FILED APRIL 18, 2007
FOR: PISTON MADE OF ALUMINUM :
CAST ALLOY AND METHOD OF
MANUFACTURING THE SAME

SECOND DECLARATION UNDER 37 C.F.R. § 1.132

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

SIR:

I, Hajime Ikuno, a citizen of Japan, hereby declare and state that:

1. I have a Master's degree in metallic material engineering, which was conferred upon me by Osaka University located in 2-1 Yamadaoka, Suita, Osaka, Japan.
2. I have been employed by Toyota Central Research & Development Laboratories, Inc., since 1985 and I have a total of 22 years of work and research experience in the field of metallic materials.
3. The following experiments were carried out by me or under my direct supervision and control.
4. The experimental conditions used to create Tables 9, 10 and 11 of the specification were used to produce the attached Tables 13 and 14.

5. Table 13 presents data for the low Mg embodiments (i.e., Mg (Magnesium): equal to or less than 0.2 mass%") of independent Claims 1 and 31).

6. Table 14 presents data for the medium Mg embodiments (i.e., "Mg (Magnesium): 0.2-2 mass%") of independent Claims 15 and 26.

7. In Table 13, Sample Nos. A1-A4 and C1-C4 correspond to Sample Nos. A1-A4 and C1-C4, respectively, in the specification at Tables 9 and 11; Sample No. D1 corresponds to Sample No. A+ in the Declaration Under 37 C.F.R. 1.132 filed March 15, 2007; and Sample Nos. D2-D3 is data not previously presented.

8. In Table 14, Sample Nos. B1-B3 correspond to Sample Nos. B1-B3, respectively, in the specification at Table 10; Sample No. E1 corresponds to Sample No. B+ in the Declaration Under 37 C.F.R. 1.132 filed March 15, 2007; and Sample Nos. E2-E7 is data not previously presented.

9. The symbol \circ in Tables 13 and 14 has the same meaning as in Tables 9, 10 and 11, namely that "the structure is fine and homogenized" (specification at page 45, lines 9-10). The symbol \circledcirc in Table 14 means that the structure is particularly fine and homogeneous.

10. The symbol Δ in Tables 13 and 14 has the same meaning as in Tables 9, 10 and 11, namely that "the texture is rather coarse and rather heterogeneous" (specification at page 45, lines 10-11).

11. The symbol x in Table 14 has the same meaning as in Tables 9, 10 and 11, namely that "the structure is heterogeneous" (specification at page 47, lines 25-26).

12. In Table 13, Sample Nos. A1-A2, C2 and D1 contain Ca within the range of independent Claims 1 and 31 of "Ca(Calcium) : 0.0005-0.003 mass%" and show homogeneous microstructure (texture). In contrast, Sample Nos. A3, A4, C3 and C4, which contain less Ca than "Ca(Calcium) : 0.0005-0.003 mass%", and Sample Nos. D2 and D3, which contain more Ca than "Ca(Calcium) : 0.0005-0.003 mass%", exhibit microstructures (textures) that are coarse and non-homogenous.

13. Table 13 shows that a significant improvement in homogeneous microstructure (texture) is achieved in the low Mg embodiments of independent Claims 1 and 31 over the range of "Ca(Calcium) : 0.0005-0.003 mass%".

14. In Table 14, Sample Nos. B1, E1, E3, E4 and E5 contain Ca within the range of independent Claims 15 and 26 of "Ca(Calcium) : 0.0005-0.003 mass%" and show homogeneous microstructure (texture). In contrast, Sample Nos. E2, E6 and E7, which contain less Ca than "Ca(Calcium) : 0.0005-0.003 mass%", and Sample Nos. B2 and B3, which contain more Ca than "Ca(Calcium) : 0.0005-0.003 mass%", exhibit microstructures (textures) that are non-homogenous.

15. Table 14 show that a significant improvement in homogeneous microstructure (texture) is achieved in the medium Mg embodiments of independent Claims 15 and 26 over the range of "Ca(Calcium) : 0.0005-0.003 mass%".

16. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this application or any patent issuing thereon.

Application No. 10/620,388
Declaration Under 37 C.F.R. § 1.132

17. Further declarant saith not.

Date: November 2, 2007

Hajime Ikuno

Hajime Ikuno

Attached:

Tables 13-14
Figs. 5-25

2007.9追加データ

Table 13

sample No.	chemical composition (mass%)										texture	fig.			
	Si	Cu	Mg	Ni	Fe	Mn	Cr	Ti	B	Zr	V	P	Ca		
A1	13.8	3.0	<0.01	2.3	0.4	0.4	—	0.20	—	0.10	0.06	0.01	0.0012	○	fig.5
A2	13.8	3.0	<0.01	2.3	0.4	0.4	—	0.25	—	0.10	0.06	0.01	0.0009	○	fig.6
A3	13.8	3.0	<0.01	2.3	0.4	0.4	—	0.20	—	0.10	0.06	0.01	0.0002	△	fig.7
A4	13.8	3.0	<0.01	2.3	0.4	0.4	—	0.25	—	0.10	0.06	0.01	0.0003	△	fig.8
C1	13.5	3.0	<0.01	2.4	0.4	0.4	0.02	0.19	—	0.12	0.06	0.01	0.0003	○	fig.12
C2	13.4	2.9	<0.01	2.4	0.4	0.4	0.02	0.24	—	0.12	0.08	0.01	0.0006	○	fig.13
C3	13.8	3.0	<0.01	2.3	0.4	0.4	<0.01	0.20	—	0.10	0.06	0.01	0.0002	△	fig.14
C4	13.8	3.0	<0.01	2.3	0.4	0.4	<0.01	0.25	—	0.10	0.06	0.01	0.0003	△	fig.15
D1	13.8	3.2	<0.01	2.3	0.4	0.4	—	0.25	—	0.10	0.10	0.01	0.0030	○	fig.16
D2	12.7	3.1	<0.01	2.3	0.4	0.4	—	0.25	—	0.03	0.10	0.01	0.0060	△	fig.17
D3	12.8	3.0	<0.01	2.4	0.4	0.4	—	0.18	—	0.105	0.07	0.01	0.0090	△	fig.18

Table 14

sample No.	chemical composition (mass%)										texture	fig.			
	Si	Cu	Mg	Ni	Fe	Mn	Cr	Ti	B	Zr	V	P	Ca		
B1	12.9	2.8	0.6	2.5	0.4	0.4	—	0.25	—	0.06	0.03	0.02	0.0030	○	fig.9
B2	12.4	2.9	0.7	2.3	0.5	0.4	—	0.28	—	0.10	0.10	0.01	0.0040	×	fig.10
B3	12.9	2.8	0.6	2.5	0.4	0.4	—	0.25	—	0.06	0.03	0.02	0.0044	×	fig.11
E1	12.8	3.2	0.7	2.3	0.5	0.5	—	0.23	—	0.10	0.08	0.01	0.0005	○	fig.19
E2	11.3	2.8	0.5	1.8	0.2	0.2	—	0.18	—	0.04	3.00	0.005	0.0003	△	fig.20
E3	11.3	2.8	0.5	1.8	0.2	0.2	—	0.18	—	0.04	3.00	0.005	0.0009	○	fig.21
E4	12.2	3.0	0.8	2.3	0.4	0.4	—	0.20	—	0.09	0.10	0.01	0.0006	○	fig.22
E5	12.2	3.0	0.8	2.3	0.4	0.4	—	0.23	—	0.09	0.10	0.01	0.0010	◎	fig.23
E6	13.4	3.2	1.0	2.9	0.7	0.7	—	0.29	—	0.29	0.16	0.013	0.0004	×	fig.24
E7	16.9	3.3	1.0	2.7	0.7	0.7	—	0.29	—	0.28	0.14	0.015	0.0002	×	fig.25

Fig. 5



Fig. 6

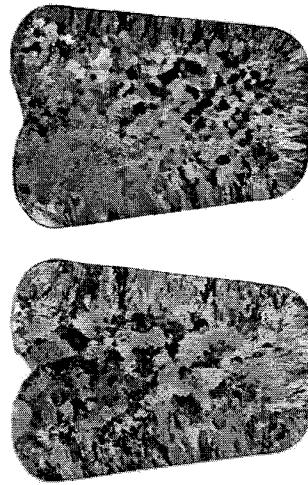


Fig. 7

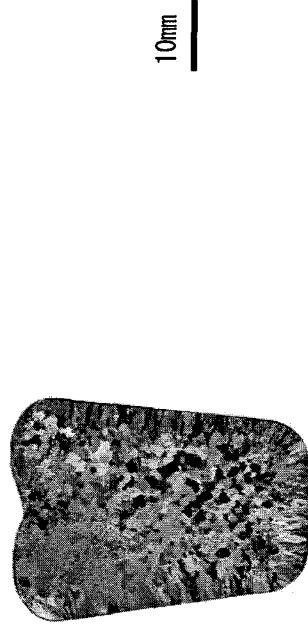


Fig. 8

Sample : A1

Sample : A2

Sample : A3

Sample : A4

Fig. 12

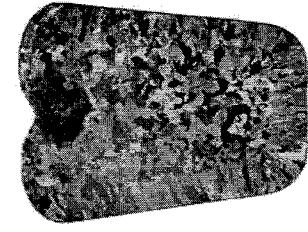


Fig. 13

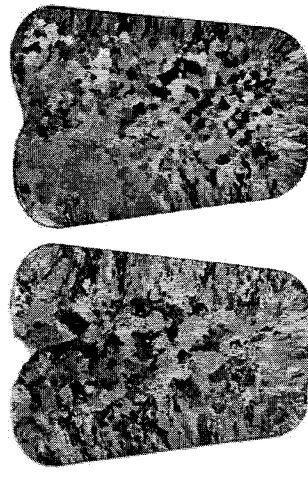


Fig. 14

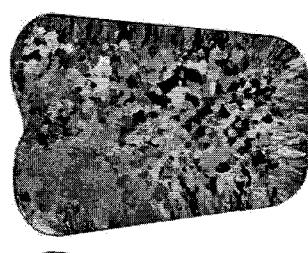


Fig. 15

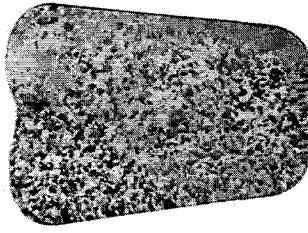


Fig. 17

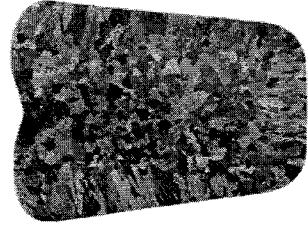


Fig. 16

Sample : C1

Sample : C2

Sample : D2

Fig. 20

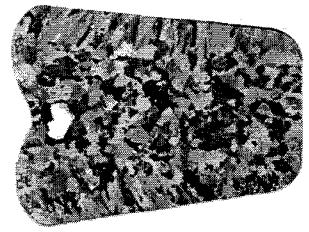


Fig. 21

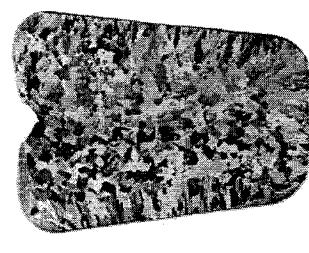


Fig. 22

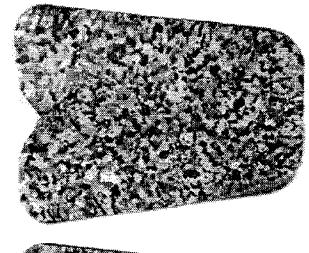


Fig. 23



Fig. 25

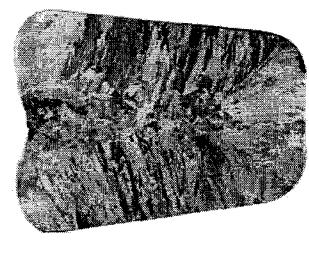


Fig. 24

Sample : E7

Sample : E6

Sample : E5

Sample : E3

Sample : E2

Sample : E4

Sample : E5

Sample : E6

Fig. 9

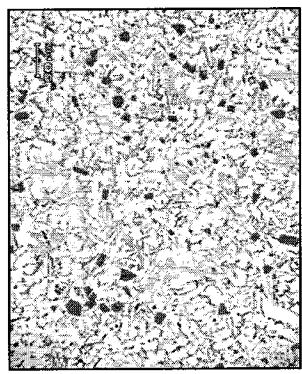


Fig. 10



Fig. 11

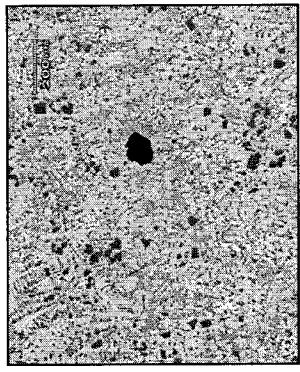


Sample : B1

Sample : B2

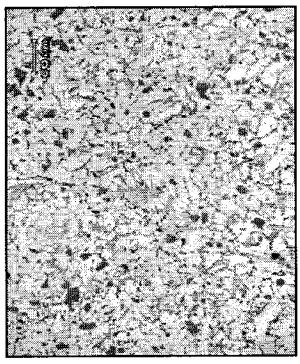
Sample : B3

Fig. 18



Sample : D3

Fig. 19



Sample : E1

Fig. 11

